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A STUDY ON SOCIAL MEDIA APPLICATION AS A TOOL TO SHARE INFORMATION DURING FLOOD DISASTER

Kamarul Faizal Hashim, Siti Hasanah Ishak and Mazida Ahmad
School of Computing, College of Arts and Sciences, Universiti Utara Malaysia, Sintok, Kedah, Malaysia
E-Mail: kfaizal@uum.edu.my

ABSTRACT

Social media is gaining its popularity as one of the most used ICT medium. It allows users to communicate without the space and time boundary. Recently, previous works have acknowledged the important of social media as one of the most widely used ICT tools to share information during the event of disaster. Although social media is gaining popularity it is unknown how this application fit the task of information sharing. Examining the fit between task and technology is very important to ensure that individual can gain desired benefit performing a task using a certain technology/information system. Hence, this study is carried out to determine the what are the determinant factors that influence fitness between social media and information sharing tasks during disaster. This study used task-technology fit (TTF) theory as its underlying theory. Quantitative research method was used. Data for this research is collected using web based questionnaire. The data is analyzed using Structural Equation Modeling (SEM) Partial Least Square (PLS) technique. The results of this study show that task characteristic has stronger influence over technology characteristic. This paper ends by concluding its contributions and limitations.

Keywords: disaster management, flood in Malaysia, knowledge sharing, task-technology fit (ttf).

INTRODUCTION

Social media is an online media that provides a space for users to connect without time and space boundary. It is famous with interactivity and information sharing activity (Yates and Paquette, 2011) by allowing not only text, but also other rich media including images, graphics, and video as well as links to be shared (Dabner, 2012). Among the famous social media include Facebook, Twitter, Youtube, Instagram, Blog, Wiki, and virtual community.

Every year, the use of social media increases drastically. As an example, the 100 millions Facebook users in 2008 has increased to 1.11 billion in March 2013 (http://www.statisticbrain.com/facebook-statistics/). With the huge number of users, the social media has not only been used for interacting, but also for education (Wolf, Wolf, Frawley, Torres and Wolf, 2012), marketing (Pradiptarini, 2011), political messages (Tumasjan, Sprenger, Sandner and Welpe, 2010), promoting charity work (Barnes and Mattson, 2010), and in emergency (Kaigo, 2012; Shklovski, Palen and and Sutton, 2008; Yates and Paquatte, 2011).

Recently, social media has been identified as one of potential tools for sharing information during disaster (Yates and Paquatte, 2011). The Wikipedia and virtual collaborative applications was used in sharing information during the earthquake in Haiti islands in 2010. It was found useful as it only requires minimum supervision in its implementation (Yates and Paquette, 2011).

Although the social media is clearly beneficial and is able to increase the effectiveness of disaster management, in some conditions it is non-effective (Hagar, 2012; Kaigo, 2012; Yates and Paquette, 2011). According previous research, it allows every one to load too much information simultaneously without any filtering mechanism. This raises doubts in the accuracy of the shared information (Hagar, 2012; Kaigo, 2012; Yates and Paquette, 2011). At the same time, respected agencies will face difficulties in making decision (Hagar, 2012).

Majlis Keselamatan Negara (MKN) is the main government agency that manage disasters in Malaysia. Besides all the rescue work, MKN is also responsible in sharing information about a disaster to the community. A number of ICT application has been developed by MKN for the purposes of sharing information with the community during disasters such as 1) MKN official portal, 2) MKN social media (Facebook and Twitter). From our observation, these communication channels have been widely used to facilitate information sharing during the event of disaster. Although that is the case, how effective social media application can be used to support information sharing during the event of disaster is not clear.

Within information systems literature, the fit between tasks and technology refers to how much the used technology could increase the effectiveness of task in hand (i.e., information sharing) (Dishaw and Strong, 1998; Goodhue and Thompson, 1995). According to Goodhue and Thompson (1995), Dishaw and Strong (1998), and Zigurs and Buckland (1998) a technology (i.e, social media) is considered as fit when it provides suitable features that is able to support the task (i.e, information sharing). Social media is fit with information sharing tasks when its functions could support information sharing needs (Benslimane, Plaisent and Bernard, 2002; Dishaw and Strong, 1998; Goodhue and Tompson, 1995).

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THEORETICAL BACKGROUND AND RESEARCH MODEL

Task-Technology Fit Theory

Goodhue and Thompson (1995) introduced the technology-task congruity model to explain how technology affects performance. They believe that TTF will influence the use of technology and its performance when the technology is appropriate with the tasks. This reflects that a technology fits when it performs appropriate tasks (Dishaw and Strong, 1998). Further, Lippert and Forman (2006) stress on the features that make technology fits with the tasks. Accordingly, all factors lead to the formation of a model illustrated in Figure-1.

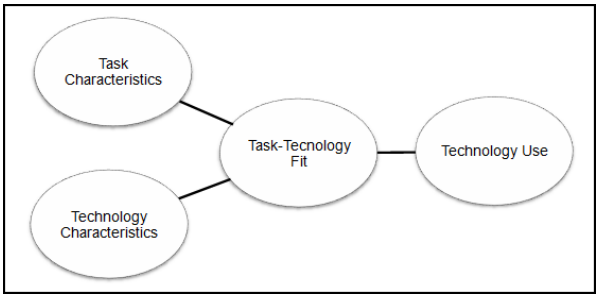

Figure-1. General model on technology-task fitness.

Figure-1 illustrates four main components of TTF: task characteristics, technology characteristics, technology-task fit, and technology use. This theory proposes that technology use could be expected when task characteristics fit technology characteristics. However, technology use is influenced by task and technology characteristics through TTF.

In that situation, Goodhue and Thompson (1995) views TTF as a level where technology could assist people in performing their tasks. Regarding this study, fitness between task and technology refers to the extent social media is appropriate in information sharing (Dishaw and Strong, 1998). In more detail, technology (i.e, social media) includes the characteristics and features in performing tasks (i.e, information sharing) (Goodhue and Thompson, 1995). In TTF, task refers to individual's action in transferring input into output to fulfill information sharing needs, while technology use refers to the practice of using technology in accomplishing tasks.

TTF is defined as the use of information system (IS), in which performance is made when IS supports the task being carried out (Furneaux, 2012). The theory has been used by individuals and by groups; however more works have been reported on individual's tasks. While Goodhue and Thompson (1995) have proposed a model that affect performance at individual level (D'Ambra and Wilson, 2004; Dishaw and Strong, 1999; Klopping and McKinney, 2004; Lin and Huang, 2008; Lippert and Forman, 2006), Zigurs and Buckland (1998) proposed a model at grop level particularly in group support system (GSS) environment (Zigurs, Buckland, Connolly and Wilson, 1999).

Eventually, TTF by Goodhue and Thompson has been a famous reference model in IS, being used widely in various domains in automotive technology to support insurance-related activities (Lee, Cheng and Cheng, 2007). Besides, Tjahjono et al. (2001) used it in studying the fitness in task support system in improving performance; Teo and Men (2008) used it in studying the use of portal in supporting information management activities; Gagnon and McCharthy (2004) used it is observing the fitness of management support system in universities; and Pai (2012) studied the fitness of electronic business in knowledge integration activities.

Besides, TTF has also been integrated with theory acceptance model *(*TAM) to explain the factors of software usage and its relation with user performance in detail. Dishaw and Strong (1999) found that the integration model provides clearer explanation compared to the model alone. Hence, Klopping and McKinney (2004) support the integration by implementing it in their study. On the other hand, Lin and Huang (2008) integrate TTF with *Social Cognitive Theory* (SCT) in studying the potential background of knowledge management system (KMS) for information sharing. Besides, TTF has also been integrated with *Theory of Planned Behavior* (TPB) to inspect the background potential of electronic knowledge repository (EKR) for information searching (Kankanhalli, Tan and Wei, 2005).

In this study, TTF is used to measure the fitness of social media especially Facebook over information sharing task during flooding. The fitness between technology and task is important because it helps evidencing that social media is beneficial, further, encouraging communities to use them (Benslimane et al., 2000). In other words, the fitness of technology and tasks conveys the ability of social media in supporting information sharing effectively (Benslimane et al., 2002; Dishaw and Strong, 1998). Accordingly, this study makes use of TTF in studying the fitness of social media in information sharing tasks during flooding because the focus ofthis study is fit or congruity.

Hypotheses

This study outlines eight hypotheses. Altogether, there are seven hypotheses with positive relationship (H1, H2, H4, H5, H6, H7) while one hypothesis has negative relationship (H3). They are explained in the following paragraphs.

With reference to TTF, a technology is assumed fitting the tasks when the ability of the technology is appropriate with the task characteristics (Dishaw and Strong, 1998). Further, Benford and Hunton (2000) explain that task accomplishment is optimizable when there is a good fit between the technology and the task. Then D'ambra and Wilson (2004) found that people believe that a technology could assist them in doing

something if they are confident that the technology highly fits the tasks they are doing (Gagnon and McCarthy, 2004; Lin and Huang, 2008). In the context of disaster, technology plays important roles in information sharing (Yates and Paquatte, 2011). Therefore, the technology to be used in disaster must highly fit the task being carried out to ensure the technology support users' tasks. Thus, this study hypothesizes that the anticipation of the fitness between technology and tasks is high if the MKN social media is able to support the characteristics of information sharing task.

H1: The anticipation of technology-task fit is influenced positively by the characteristics of information sharing.

Besides the characteristics of tasks, people's anticipation on TTF is also determined by the characteristics of technology (Benslimane et al., 2002; Benford and Hunton, 2000; Goodhue and Thompson, 1995; Lin and Huang, 2008). Particularly, Goodhue and Thompson (1995) discuss that a technology is assumed fit if it has characteristics that support users' tasks. It is agreed by Venkatesh and Davis (2000) and Lin and Huang (2008), who address that people have a good view of TTF if the characteristics of technology could fulfill their expectation. Further, an assessment is able to determine whether a technology is able to support user tasks. During disaster, technology is important to function in information sharing (Yates and Paquatte, 2011). The technology should be able to smoothen the task completion. Hence, the characteristics of the technology determines whether it could function as desired (Ong and Lai, 2007). Therefore, a technology is assumed highly fitting the user tasks during disaster. Hence, this study hypothesizes that the fit of MKN social media with the user tasks is determined by its characteristics.

H2: The anticipation of technology-task fit is influenced positively by the characteristics of the technology.

In the context of information sharing, information sharing task is influenced by the level of tacit and explicit knowledge. Traditionally, tacit knowledge is obtained through experience, which could be shared through interactive techniques such as storytelling and informal sharing (Zack, 1999). With the use of ICT, tacit knowledge could be acquired through reading, discussion, and chatting online (Panahi, Watson and Partridge, 2012). Kankanhalli et al. (2005) found that the success of information sharing using ICT is determined by the ability of the receiver to understand the tacit knowledge in the conversation. When the tacit knowledge is ambiguous, more time would have to be spent in understanding the information being shared (Teo and Men, 2008). Further, if the tacit knowledge is hardly understood, it is highly tacit, which interferes the information sharing process and its smoothness. Therefore in disaster, the tacitness of the knowledge influences the information sharing task. Hence, this study hypothesizes that the tacit knowledge in MKN social media influences information sharing task during disaster. Particularly, highly tacit knowledge will distort the information sharing task.

H3: Information sharing task is negatively influenced by the level of tacit knowledge.

Besides, the task is also influenced by the level of explicit knowledge (Lou, 2009). Lou found that explicit knowledge positively influence the information sharing attitude. Particularly, highly explicit knowledge is easily formed and transferred to other people (Nonaka, 1994). In fact, Nonaka (1994) explains that explicit knowledge could be transformed in written form such as using database. Teo and Men (2008) also believe that detail information could be accessed and understood easily and quickly. In fact, it could be shared quickly (Zander and Kogut, 1995). Therefore in the context of disaster, the level of explicit knowledge positively influences information sharing. Consequently, clear information eases users to understand and share information with the community.

H4: Information sharing task is positively influenced by the level of explicit knowledge.

On the other hand, Ong and Lai (2007) argue that a successful or effective technology is determined through user satisfaction. User satisfaction of a technology refers to the extent the users believe that the technology satisfies them (Ong and Lai, 2007). Studies have found a series of characteristics that satisfy users, including clear content (Zhou and Zhang, 2009), easy to use and community support. Support from experts is important in ensuring that the information is valid and avoiding spam. Inaccurate contents could lead to misunderstanding between the agency and users (Parker, Moleshe and Harpe, 2006). In the context of disaster, social media has been an important application for sharing information to the community (Shklovski et al., 2008). Therefore, the content in the social media should be accurate, updated, and fulfilling community needs. This encourages the community to utilize the social media in gathering information during disaster. Hence, the content in social media influences the characteristics of technology positively.

H5: The characteristics of technology is positively influenced by the content.

Besides content, the characteristics of technology are also influenced by the ease-of-use. The ease-of-use is important for social media because it is one of the factors that forms human perception (Kim and Stoel, 2004). Ranganathan and Ganapathy (2002) found that the ease-of-use refers to the design of the social media.

Particularly, the navigation aspect should be easy. It is agreed by Kaynama and Black (2000) who found that the navigation in social media increases its' services. Therefore in the context of disaster, social media must offer easy navigation styles. Hence, easy-to-use social media influences the use of technology.

H6: The characteristics of technology are influenced positively by the ease-of-use.

Finally, characteristics of technology that support information sharing are also influenced by the attitude of the community who use the technology (Ong and Lai, 2007). Ong and Lai urge that community support is important in encouraging their collaboration to make the communication more flexible. The social media has been found improving community's information sharing and their collaboration (Bollinger and Smith, 2001). Based on the authors, the community will be more inclined to share information using this aplication if they feel the collaboration is exist among themselves. The collaboration exist among community will create a good bond and it's motivate them to share their information (Duffy, 2001). Therefore, in the context of this study, MKN social media will have good characteristics if it is able to support the formation of collaborative community in sharing information, specifically during flooding.

H7: The characteristics of technology is positively influenced by the community.

RESEARCH METHOD

Data collection

The instrument in this study was developed by adapting from the existing studies. All items were selected based on their contribution TTF. Seven-point Likert scale is used, between 1 (strongly disagree) and 7 (strongly agree).

For the purpose of determining the content validity, a series of discussions with three experts in the field has been carried out. They were asked to comment on the research instrument. As a result of the discussions, a few minor wording changes have been made, in which no item was removed or added. On top of that, a pilot study has been carried out to determine the reliability of the instrument. The pilot study follows the procedures of the real data collection phase, in which it involved 30 students of Universiti Utara Malaysia. The measurement and structural model were analyzed (using SmartPLS). Having obtained the results, the instruments were indicated satisfactoryly reliable and valid.

Having determined that the instruments are reliable and valid, the actual data were gathered. It was carried out using online services, in which the instruments were distributed using Web technology. The web survey was open to respondents for almost 6 months. Only respondents who have experienced using the MKN social media are considered in this study. In overall, 168 respondents participated in the web survey. Out of that, this study managed to gather 133 meaningful data sets, which were further analyzed.

Specifically, this study makes use of Partial Least Square (PLS) technique for analyzing the data. Gefen et al. (2000) recommend that PLS is able to predict the relationship among factors in the constructed model. Therefore, it is appropriate for this study because this study determines to predict the factors influencing the fitness of social media technology with information sharing during disaster, particularly flood. Thus, this study makes use of SmartPLS 2.0 and SPSS 19.0 in analyzing the measurement and structural models.

DATA ANALYSIS AND RESULTS

Demographic Information

As for this study, majority of the respondents were female (66.17%). With 9.77% aged between 20 to 25 years old, 57.14% aged between 26 to 30 years old, 13.53% aged between 31 to 35, 12.78% aged between 35 to 40, and 6.78% were aged 40 and above years old. Further, 27.07% were students and 72.93% of the respondents were workers. All respondents have had experience using facebook to obtain information during the flood disaster.

Measurement Model

The quality of the measurement model was analyzed based on its convergent and discriminant validity. The convergent validity was evaluated based on Fornell and Larcker's (1981) two criteria: (1) all the indicators must be significant (at least at 0.05 value) and their loading should exceed 0.7 and (2) average variance extracted (AVE) by each construct should exceed the variance due to measurement error for that construct (in other words, the AVE should exceed 0.50). Table 1 demonstrates that all item loadings exceed 0.7 on their respective construct and are all significant at the level of $p < 0.001$. Also the AVE values are above 0.50, ranging from 0.6019 to 0.9046. Hence both criteria for convergent validity are satisfied.

Meanwhile as for discriminant validity, it was evaluated using one of the most commonly used criteria in PLS: the square root value of the AVE for each construct should be greater than the inter correlations between constructs in the model (Chin, 1998). The square root value of AVE for each construct are bolded in Table-2. The analysis shows all AVE square root values are greater than the intercorrelation values between constructs. Hence the criterion for discriminant validity is satisfied.

Structural Model

Figure-2 shows the results of the structural model. The model explains a significant amount of variance in the dependent variable for task-tecnology fit (R^2 =0.641), task characteristic (R^2 =0.637) and

technology characteristic (R^2 =0.628). Task-technology fit is strongly influenced by task characteristic (β=0.641, t=12.485, p<0.0001) and followed by technology characteristic (β=0.241, t=4.246 , p<0.0001). Meanwhile task characteristic is influenced by explicit knowledge (β=0.740, t=12.522, p<0.001). Technology chareacteristic is influenced by content (β=0.221, t= 0.349, p<0.001), ease of use (β=0.304, t=3.562, p<0.001) and community (β=0.388, t=4.947, p<0.001). On the other hand, task characteristic is not significantly influence by tacit knowledge (β=0.041, t=1.546, not significant). All proposed hypotheses received significant statistical support except for H3.

Table-1. Items loading, CR and AVE value

	Code	Items	Loading	T-Statictic	CR	AVE
Task-technology fit	TTF1	The functionalities of MKN Facebook are very useful to carry out information sharing task.	0.865	17.690	0.9406	0.7985
	TTF2	The functionalities of MKN Facebook made the information sharing tasks very easy.	0.936	52.546		
	TTF3	The functionalities of MKN Facebook are very helpful.	0.899	26.708		
	TTF4	In general, the functionalities of MKN Facebook are best fit information sharing task.	0.873	34.881		
Task characteristic	KS1	I use MKN Facebook to: a) Obtain information.	0.852	33.178	0.8935	0.737
	KS2	b) Share information.	0.913	45.628		
	KS3	c) Give feedback.	0.807	15.071		
Tacit knowledge	TAC1	I communicate through MKN Facebook to share information.	0.950	53.542	0.9499	0.9046
	TAC2	I communicate through MKN Facebook to obtain information.	0.952	74.257		
Explicit knowledge	EXP1	The information available in MKN Facebook is easy to be documented in manuals or reports.	0.770	11.720	0.8808	0.7121
	EXP2	The information available in MKN Facebook is easy to understand compared to written documents (e.g. manuals, reports).	0.897	38.565		
	EXP3	The information available in MKN Facebook is easy to communicate without having personal experiences.	0.859	23.386		
Technology characteristic	TECH1	The quality of my information pertaining of disaster has improved because the used of MKN Facebook.	0.884	34.229	0.9285	0.8123
	TECH2	I can accomplished information regarding of disaster more quickly because of MKN Facebook use.	0.920	43.088		
	TECH3	I have increased my information about disaster because of MKN	0.899	38.449		

		Facebook use.				
Content	CONT1	MKN Facebook provide correct content.	0.706	9.059	0.8577	0.6019
	CONT2	MKN Facebook provide integral content.	0.787	13.949		
	CONT3	The content provided within MKN Facebook is easy to read.	0.784	20.600		
	CONT4	MKN Facebook provide practicable content.	0.821	15.708		
Ease of use	EOU1	MKN Facebook make it easy for me to search/retrieve disaster related information.	0.873	28.143	0.9104	0.7722
	EOU2	MKN Facebook make it easy for me to share disaster related information.	0.905	33.629		
	EOU3	The organization and structure of MKN Facebook is easy to follow.	0.858	22.708		
Community	COM1	MKN Facebook make it convenient for me to discuss issues pertaining of disaster to others.	0.889	31.596	0.9519	0.8321
	COM2	MKN Facebook make it convenient for me to input comments and feedback to others.	0.919	43.103		
	COM3	MKN Facebook make it convenient for me to share the disaster related knowledge with other community.	0.937	76.031		
	COM4	MKN Facebook make it convenient for me to access the shared knowledge by others.	0.903	34.001		

Table-2. Intercorrelation Matrix and AVE Square Root values

	COM	CONT	EOU	EXP	KS	TTF	TACIT	TECH
COM	**0.9122**							
CONT	0.4837	**0.7758**						
EOU	0.7131	0.6225	**0.8787**					
EXP	0.4289	0.5873	0.5238	**0.8439**				
KS	0.6296	0.5198	0.6059	0.4835	**0.8585**			
TTF	0.6636	0.3947	0.6245	0.4644	0.7750	**0.8936**		
TACIT	0.5873	0.4388	0.5676	0.5123	0.7932	0.7588	**0.9511**	
TECH	0.7124	0.5985	0.7189	0.5773	0.5535	0.5964	0.5811	**0.9013**

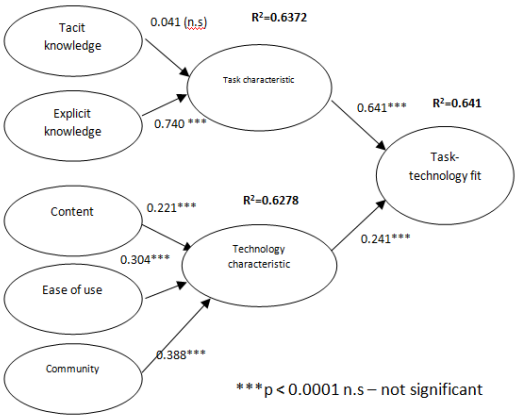

Figure-2. Result of research structural model.

DISCUSSIONS AND CONCLUSIONS

This study was conducted to examine the fitness between social media and information sharing tasks during disaster. Based on the literature review, this study posited that the fitness of the social media and knowledge sharing during flood is influenced by task and technology characteristics. While task characteristic is influenced by tacit and explicit knowledge and technology characteristic is influenced by content, ease of use and community.

Based on the results, this study demonstrated that community have used social media for information sharing during the disaster. They have used Facebook to obtain and share information regarding of flood. The community have used the social media because of the ability of this application to support information sharing in the occurrence of flood. Thus, the fitness of social media in information sharing should be given towards the task and technology characteristics.

Based on this study, task characteristic refers to information sharing and technology characteristic refers to social media. While information sharing is influenced by tacit and explicit knowledge. From the finding, tacit knowledge is negatively influenced information sharing because of the ambigious of the information in the social media. While, explicit knowledge is positively influenced information because of the information provided in the social media is stated clearly. Besides that, the fitness of the social media and information sharing also strongly influenced by technology characteristic. From the finding, the community are likely to use social media because of its content, ease of use and community in this application that support information sharing during the flood. The content that clear, updated and fulfill community needs encourages the community to utilize the social media in gathering information during disaster. Besides that, the ease of use and community support in the social media also influenced the technology characteristic.

Theoretically, the main contribution in this paper is to: 1) developing a more comprehensive understanding of the fit of using Facebook as one of the applications to assist knowledge sharing task among community. Task technology fit theory was synthesized and modeled to examine the fit of Facebook to assist knowledge sharing task during the event of flood; 2) examining the fitness of Facebook's indicators significantly in assisting information sharing tasks among community. This understanding is important as it can help promote the use of Facebook in sharing knowledge related to flood among community and; 3) proposing a theoretical model that can predict the fit of Facebook to facilitate knowledge sharing activities during the event of flood. This model is important to examine the fit of Facebook as a tool to share knowledge during the occurrence of floods in Malaysia.

In term of practical contributions, this study contributes by providing practical guidelines to government agencies involved in disaster management to predict user evaluation of the social media tools (i.e., Facebook) in order to gather information related to disasters.

Finally, the results of this study must be interpreted with some caution. The limitations are: 1) the results are not generalizeable as this study only collected data from a community from disaster that focus on flood only; and 2) only the user that click "like" button of the MKN Facebook page can share and obtain information from that page. So the dissemination of the information is not widely because its limit to the only community that "like" that page. Perhaps, from these limitation hopefully this study can be extended to other type of disaster and the dissemintation disaster related information of the MKN Facebook can be accessed widely.

As the conclusion, the fitness of the technology and task is important because it helps evidencing that social media is beneficial, further, encouraging communities to use them (Benslimane et al., 2000). The community used social media mainly MKN Facebook because its support information sharing during the disaster events.

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